Tables and curves are given showing the relation between magnetising force and changes of length in each metal.

Bismuth was found to be slightly elongated in strong fields, though no change could be detected with forces of less than about 500. The greatest elongation observed was about 1·5 ten-millionths of length.

Manganese-steel was almost unaffected. The elongation in a field of 850 was estimated to be about one fifty-millionth of the length.

Finally, it is shown that the mechanical stress produced in iron by magnetism does not account for more than one-fifth part of the observed magnetic retraction.

An Appendix to the paper contains evidence of the high degree of accuracy obtainable by the method of observation employed. In the very great majority of the measurements of elongation and retraction, the probable error was less than one two-and-a-half-millionth part of an inch, or one hundred-thousandth of a millimetre; and the results of experiments made upon different days (the apparatus having been in the meantime dismantled), or with currents of ascending and of descending strength, were strikingly concordant. This degree of precision is attributed to the perfection of the optical arrangements, which rendered it possible to project the image of a wire with such sharpness, that after reflection from a mirror its position upon a scale 24 feet (732 cm.) distant could be read to a quarter of a scale division, each whole division being equal to $\frac{1}{40}$-inch (0·64 mm.). The magnifying power was such that a change of one two-and-a-half-millionth part of an inch (or one hundred-thousandth of a millimetre) in the length of the rod under examination caused the image of the wire to move through about three-quarters of a scale division. More accurately, a scale division corresponds to 0·000018 mm.

The currents used were measured by one of Ayrton and Perry's commutator ammeters, and the accuracy with which the magnetising forces were estimated, though quite sufficient for the purpose of the experiments, does not claim to be very high.

II. "On Electrical Excitation of the Occipital Lobe and adjacent Parts of the Monkey's Brain." By E. A. Schäfer, F.R.S., Jodrell Professor of Physiology in University College, London. Received February 13, 1888.

The cortex of the occipital lobe has been explored electrically by Ferrier and by Luciani and Tamburini. In ten experiments upon monkeys Ferrier was unable to obtain any movements on stimulation of this part. Excitation of the angular gyrus produced conjugate deviation of both eyes to the opposite side, with sometimes an up-

ward inclination when the anterior limb was stimulated, and a downward inclination when the electrodes were applied to the posterior limb. Luciani and Tamburini obtained only a conjugate deviation to the opposite side, without any constant upward or downward inclination, and they got a similar but less marked movement by stimulating the whole of the external surface of the occipital lobe.

The following are the results of my own observations :—Electrical excitation of the posterior limb of the angular gyrus, of the upper end of the middle temporal gyrus* (which is continuous with it) of the whole cortex of the occipital lobe (inclusive of its mesial and under aspects) and of the quadrate lobule, causes conjugate deviation of the eyes to the opposite side. The movement is not, however, in all cases a simple lateral deviation, but the lateral movement may be combined with an upward or downward inclination according to the part stimulated. Thus (1) excitation of a superior zone which comprises on the external surface the posterior limb of the angular gyrus, the upper (posterior) end of the middle temporal gyrus, and the part of the occipital lobe immediately behind the external parieto-occipital fissure, and on the mesial surface the quadrate lobule immediately in front of the upper end of the internal parieto-occipital fissure, and the occipital lobe for a short distance behind the upper end of that fissure, produces, besides the lateral deviation, a downward inclination of the visual axes which is sometimes—especially when the stimulation is applied at or near the mesial surface—so marked as greatly to obscure the lateral deviation.

(2.) Excitation of an inferior zone comprising the whole of the inferior surface of the lobe, the lower part of the mesial surface, and the posterior or lowermost part of the convex or external surface, produces, besides the lateral deviation, an upward inclination of the visual axes which, like the downward movement resulting from stimulation of the superior zone, may be so marked as partly to obscure the lateral deviation.

(3.) Excitation of an intermediate zone which comprises the greater part of the external surface (where it gradually broadens out laterally) and extends over the margin of the great longitudinal fissure to include a narrow portion of the mesial surface, produces neither upward nor downward inclination of the visual axes, but a simple lateral movement.

These zones are not sharply marked off from one another but merge gradually into one another, so that if the electrodes be applied near to the upper or lower limit of the intermediate zone there is produced a

* Excitation of the upper end of the superior temporal gyrus gives a similar result. Since this is commonly accompanied by a movement of the opposite ear, it is usually considered that subjective auditory sensations have been called up by the excitation.

slight downward or upward inclination accompanying or immediately following the lateral movement.

The upward inclination of the eyes is often accompanied by elevation of the upper lids, and the downward inclination by depression of these lids.

Simultaneous excitation of corresponding points on the two hemispheres by the same stimulus usually produces a struggle between the muscles producing the lateral movement, the eyes quivering, but not being directed more to one side than the other. On one occasion, however, when corresponding points of the mesial surfaces were simultaneously stimulated slight convergence of the optic axes was obtained.

If, as is highly probable, the movements of the eyes, which occur on excitation of the occipital lobe and adjacent parts, are the result of the production of subjective visual sensations, these effects of excitation of the several parts of that lobe and the adjoining portions of the brain would appear to indicate—1. A connexion of the whole visual area of each hemisphere with the corresponding lateral half of each retina. (This has already been ascertained to be the case from the result of removing the whole of the area on one side, bilateral homonymous hemianopsia being thereby produced.)

2. A connexion of the superior zone with the superior part of the corresponding lateral half of each retina.

3. A connexion of the inferior zone with the inferior part of the corresponding lateral half of each retina.

4. A connexion of the intermediate zone with the middle part of the corresponding lateral half of each retina.

If we imagine the visual areas of the two cerebral hemispheres to be united in the middle line we may conceive each retina as projected in its normal position over the united area. It will then at once appear that the upper and lower parts of both retinas will fall upon the corresponding parts of the united area, that the outer part of the left retina and the inner part of the right will fall upon the outer portion of the left side of the united area, and *vice versâ*, and that a vertical line bisecting each retina will fall along the line of union of the two cerebral visual areas. The parts concerned with direct or central vision will therefore correspond with a part of the mesial surface. And each pair of "identical points" of the retinas will correspond with one and the same spot of the cerebral surface.*

* A more detailed account of this investigation will appear in the April number of 'Brain.'